SECTION VI

The overriding responsibility of the Department is to protect the driving public. Some groups of drivers pose a much greater driving hazard than the average risk for the driving public as a whole. The level of increased risk may justify special treatment of such drivers, such as license restrictions, driver improvement actions and, in some cases, license revocation. The Department must make every effort to be fair to all applicants and do its best to suggest or develop methods, training, or special equipment which will allow handicapped and other groups to compensate or improve their driving without taking highly obtrusive actions, such as revocation or refusal to license. Among the most common special risk groups are: young drivers, elderly drivers, impaired drivers, drivers with medical conditions, accident repeaters, traffic violators, and commercial drivers.

Seventy-two separate restrictions are identified for driver's license coding, and a set of limitations can sometimes be tailored to the exact needs and limitations of the driver. The most familiar of these restrictions is "must wear corrective lenses," but use of other physical devices such as artificial limbs may be specified. Special vehicular equipment may be required, such as hand controls or particular mirrors. In addition, drivers may be restricted as to the areas or hours in which they may drive. Such measures allow the Department to continue licensing, for example, elderly people who can handle the low-density traffic around their home, store, and doctor's office in daylight hours, but who would be unable to cope with nighttime or freeway driving.

TITLE: The Totally Deaf Driver in California (Parts I and II)

AUTHOR(S): Ronald S. Coppin & Raymond C. Peck

DATE: July 1963
December 1964

FUNDING SOURCE: Special legislative appropriation and Federal Highway Administration

REPORT NUMBER: 15 & 16

NTIS NUMBER: PB-220025 Part I
PB-220026 Part II

PROJECT OBJECTIVE:

To determine whether or not the driving records of deaf drivers differ from those of non-deaf drivers, and whether or not deafness or other factors are responsible for any differences found. Specifically, the study was designed to ascertain whether the deaf driver represents a special risk to public safety and, if so, to suggest any necessary licensing restrictions or unique training needs.

SUMMARY:

Samples of deaf and non-deaf drivers were matched on five variables—age, annual mileage, occupation, sex, and area of residence. These matched samples were compared on traffic conviction and accident records. No significant differences were found for females; deaf males had similar violation records to, but 1.8 times the accident rate of, their nondeaf counterparts. Demographic data indicated that deaf drivers

drove a significantly greater number of miles per year and were more heavily concentrated in lower socioeconomic strata than the nondeaf.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

Further research was suggested to consider the specific types of accidents and their precipitating factors as well as analysis of driving performance by type of deafness (e.g., congenital vs. adventitious). It was suggested that the need for further or specialized training might be explored, as very few of the deaf drivers reported any formal driver training. No such research has been undertaken by the Department; however, the study has been used as a reference and quoted by researchers and traffic safety officials in other states and countries. It was quoted in the Federal Register, 12/23/76, 41(248), as a basis for the U.S. Bureau of Motor Carrier Safety's policy prohibiting deaf persons from operating interstate commercial vehicles.

SUPPLEMENTARY INFORMATION:

Published in the *Highway Research Record*, *79*, 35-44, 1965. Presented at the 43rd annual meeting of the Committee on Highway Safety Research.

TITLE: The Teen-Aged Driver

AUTHOR(S): Gareth S. Ferdun, Ronald S. Coppin & Raymond C. Peck

DATE: February 1965

REPORT NUMBER: 21

FUNDING SOURCE: Departmental Budget

NTIS NUMBER: PB-218987

PROJECT OBJECTIVE:

To examine the accident and conviction records of teenaged drivers to determine whether or not a change in the licensing age was warranted and whether or not behind-the-wheel driver training was effective in reducing accidents and convictions.

SUMMARY:

A sample of 10,000 teenagers was surveyed and data on miles driven, driving record, driving experience, and driver training were collected and analyzed. It was found that, in terms of driving record alone (mileage uncontrolled), accidents were unrelated to the age of the teenager. Violations, on the other hand, increased with age. In terms of driving performance (driver record controlled for mileage differences) accidents decreased with age but violations continued to increase. For males, age (maturity) was found to be a more dominant factor than experience with respect to driving performance. For females, the converse was true—driving experience was the more important factor.

In terms of absolute risk, the authors could find no evidence to support raising the minimum licensing age in California. In terms of relative risk there was some evidence (for males that younger drivers are more predisposed to accidents than are drivers in the later teens. However, the authors felt that this relationship was possibly a function of experience, and that delaying licensing to 18 would merely postpone the learning experience.

The sample of teenaged drivers was broken into three groups (did take, didn't take, and couldn't take) on the basis of their answer to the questionnaire item regarding the completion of a behind-the-wheel training course. (It must be remembered, the report notes, that youths who elect to take driver training may have atypical personal characteristics.) When the three groups were compared the trained group had fewer violations, but no significant differences were found between the trained and untrained groups on accidents. The authors concluded that although it is entirely possible that some programs in certain individual school districts are effective, this finding raises serious questions about the general effectiveness of statewide driver training in reducing accidents.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

The legislature subsequently increased the minimum licensing age to 18, unless the applicant has completed an approved on-road driver training program. This legislation did not evolve from the findings of the study.

SUPPLEMENTARY INFORMATION:

Published as "The Teen-Aged Driver—An Evaluation of Age, Experience, Driving Exposure and Driver Training as They Relate to Driving Record" in *Highway Research Record*, *163*, 31-53, 1967. Also see Harrington, Report #38; Peck (1985), *Alcohol Drugs & Driving*, 1(1-2), 45-61; and Peck (1996), *Effectiveness of novice driver education*, unpublished paper.

TITLE: A Profile Study of the Financially Irresponsible Driver in California

AUTHOR(S): California Department of Motor Vehicles

DATE: June 1966

REPORT NUMBER: Unnumbered

FUNDING SOURCE: Departmental Budget

NTIS NUMBER: None

PROJECT OBJECTIVE:

To develop a profile of "financially irresponsible" drivers in California; that is, drivers suspended as a result of not having insurance at the time of an accident.

SUMMARY:

In order to evaluate the personal and driving characteristics of the financially irresponsible (FI) driver, descriptive information and driver record data for three years before and one year after the financial responsibility (FR) accident were examined for 1,005 drivers. For socioeconomic, credit, and criminal data comparisons, a sample of average drivers was randomly selected from the driver record files and matched to the FI drivers on sex, marital status, and area of residence. Driver record and descriptive data comparisons of the FI driver with the average California driver and the matched sample showed the following for FI drivers:

1. they were predominately men,
2. they were predominately young,
3. fewer were married,

4. more were in lower socioeconomic groups,
5. more were bad credit risks,
6. more had a criminal arrest record,
7. one out of every three was not licensed to drive,
8. they had poor prior conviction records,
9. they had poor prior accident records,
10. in the three years preceding the FR accident, they were twenty times more frequently classifiable as negligent drivers,
11. many drove under suspension, and
12. in the year following the FR accident, they were four times more frequently classifiable as negligent drivers.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

No recommendations; this was a descriptive study only. The larger report, of which this was an appendix, contained recommendations, but they are not a subject of this summary.

SUPPLEMENTARY INFORMATION:

Published as an appendix to the report to the Legislature in accord with Chapter 1148 of the 1965 general statutes (Senate Bill 775, McAteer) by the Financial Responsibility Study Committee, California Department of Motor Vehicles, January, 1967. Also see Report #78 by Kuan and Peck (February 1981).

TITLE: The California Motorcycle Study: Driver and Accident Characteristics

AUTHOR(S): Richard M. Harano & Raymond C. Peck

DATE: July l968

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: 28

NTIS NUMBER: PB-178443

PROJECT OBJECTIVE:

To evaluate the extent of the motorcycle accident problem and to pinpoint possible areas for further research.

SUMMARY:

Two-year driving records were collected and various accident and driver characteristics were evaluated. The major findings of the study, based upon a sample of l,000 motorcycle accidents, l,000 passenger car accidents, and 358 motorcycle registrants, were as follows: The majority of motorcycle accidents occurred during daylight hours in clear weather and on straight, level roads. Motorcycle accident drivers were younger, had less driving experience, and were involved in more single-vehicle accidents than were passenger-car accident drivers. Motorcycle drivers had higher accident and conviction rates per vehicle mile of travel than passenger car drivers had. The multiple regression results revealed that age and driving experience of motorcycle drivers were significant predictors of motorcycle accidents, but not of passenger-car accidents. Biographical and attitudinal variables played a larger role in predicting convictions than

in predicting accidents. The study recommended that consideration be given to future motorcycle licensing and training programs.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

When this study was published, anyone with a valid class 3 (automobile) driver's license was also licensed to ride a motorcycle. As a result of the recommendations of this study the law was changed and, as of November l3, 1968, all persons wishing to operate a motorcycle in California who already have a valid class 3 license were required to obtain a class 4 endorsement obtainable after special written and maneuvering skills tests were passed. Persons who did not wish to first obtain a class 3 license could qualify for a class 4 license, in which case they would be licensed to operate only motorcycles. Specialized training was instituted for the examiners of such applicants.

SUPPLEMENTARY INFORMATION:

At the time of writing, motorcycle classes and endorsements have been divided into two types—M1 and M2. Class M1 gives authority to operate a motorcycle of any size, while class M2 gives authority to operate only small motorcycles, mopeds, or motorized bicycles. No one under the age of 21 can be issued either an M1 or M2 endorsement or license unless he or she has completed a CHP-sponsored motorcycle safety training program.

TITLE: The Young Driver Follow-up Study: An Evaluation of the Role of Human Factors in the First Four Years of Driving

AUTHORS: David M. Harrington

DATE: September 1971

FUNDING SOURCE: Federal Highway Administration

REPORT NUMBER: 38

NTIS NUMBER: PB-207337LL

PROJECT OBJECTIVE:

To collect biographical and driving-record data in order to provide evidence for evaluating three approaches to reducing the high accident rate among teenagers: (1) raising the licensing age to 18; (2) identifying the "accident prone" driver; and (3) improving driving via formal driving education and training.

SUMMARY:

The sample consisted of 13,915 persons who were 16 or 17 years of age when licensed in five California counties in 1962-63. This study monitored the driving record of the sample during their first four years of driving, and correlated their driving records with other biographical data.

The average number of accidents showed little change in the first four years of driving. This result was not felt to provide support for increasing the licensing age to 18. The accident rate adjusted for mileage decreased with increasing experience. Conviction rates (adjusted for mileage) either increased or showed no change across years. Considerable changes were found in accident characteristics with increasing

experience. Suspension and revocation of licenses were not very effective in keeping negligent young drivers off the road.

Citizenship grade in high school was the best predictor of accidents and convictions. Generally, more socially desirable personal attributes were associated with better driving records. The overall relationship between accident frequency and biographical data was too low to permit accurate identification of "accident prone" drivers prior to licensing, but convictions were predictable to a moderately high degree from biographical data. For those with fatal or injury accidents, the characteristics of the accidents were not predictive of the number of accidents and convictions. An optimal point system based on type of violation was slightly better than number of convictions (undifferentiated by type) for predicting future accidents.

Those taking behind-the-wheel driver training had better driving records and more socially desirable personal characteristics than those not taking the course, indicating volunteer bias. Taking these personal differences into account, driver training and classroom driver education appeared to reduce fatal and injury accidents for females, but there was no evidence of any effect on accidents of males. These findings were not considered to be totally conclusive due to the retrospective nature of the study.

Multiple-accident subjects were characterized by social deviancy, greater involvement with cars, and more reckless, emotionally-motivated driving as teenagers.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

There has been no known direct influence on California policy or operations. However, the study has been frequently cited by others as evidence against the efficacy of driver training. Following the study, more insurance companies give teenagers with good school grades a discount instead of using driver training status as a discount factor.

SUPPLEMENTARY INFORMATION:

Published in *Journal of Traffic Safety Education*, *19*(4), 6, 1972 and *Accident Analysis and Prevention*, *4*, 191-240 1972. Received the National Safety Council Metropolitan Life Award for research in accident prevention, 1973.

TITLE: Physically Handicapped Drivers: A Comparative Study of Driver Records

AUTHOR(S): Dell R. Dreyer

DATE: May 1973

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: 42

NTIS NUMBER: PB-222967

PROJECT OBJECTIVE:

This study was conducted at the request of California State Assemblyman John P. Quimby, who was interested in the driving record of handicapped persons with loss of, or limited control of, one or more of their limbs. This study was expected to be useful in evaluating California's driver licensing policy and in providing some guidance to insurance companies in establishing premiums for handicapped drivers. California's

policy has been to license physically handicapped persons who meet the same standards on the written and on-road examinations as non-handicapped persons. The purpose of this study was to determine whether or not handicapped drivers have accident records different from those of non-handicapped drivers, and consequently, whether there is any basis for differential licensing standards or insurance premiums.

SUMMARY:

A 20% sample of the driver's license file resulted in 694 handicapped drivers with unexpired licenses, representing an estimated population of 3,500. This handicapped sample was compared to a sample of 1,237 normal drivers. When compared on biographical variables, handicapped drivers were more likely to be male, single, and older. Their driving records appeared to be as good as or better than those of normal drivers. Both male and female handicapped drivers had a similar involvement in total accidents and a lesser number of convictions than the normal driver, but there was an indication that male handicapped drivers may be involved in more fatal and injury accidents than normal. In those fatal and injury accidents involving two or more motor vehicles, the handicapped driver was less likely to be at fault. No significant differences were found when comparing the driving record of the various restriction groups.

The author concluded that, from these results, it did not appear that differential licensing standards or insurance rates could be justified on the basis of the handicap alone. The insurance question could not be fully answered by this study since: (1) it included only reportable accidents, and (2) insurance rates are often based upon more than one person per policy and the number of miles driven, etc., which were not considered.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

The Department concurred with the findings, and no differential testing methods were scheduled for development. The insurance industry was made aware of the study findings, but it is not known whether it had any impact on insurance underwriting policy.

SUPPLEMENTARY INFORMATION:

None available.

TITLE: A Customized Approach to the Drinking Driver (Senate Concurrent Resolution 44 - Harmer)

AUTHOR(S): William V. Epperson, Richard M. Harano, & Raymond C. Peck

DATE: June 1975

REPORT NUMBER: Unnumbered

FUNDING SOURCE: Departmental Budget

NTIS NUMBER: None

PROJECT OBJECTIVE:

(1) to explore the validity and effectiveness of drinking-driver classification systems, (2) to evaluate the use of medical advisory boards to classify drinking drivers, and (3) to evaluate various drinking-driver programs.

SUMMARY:

The study found that a moderate degree of internal validity and reliability can be obtained by classifying drinkers and drinking drivers along a problem-drinking continuum by means of blood alcohol concentration (BAC), prior driving-under-the-influence (DUI) convictions, and tests such as the Michigan Alcoholism Screening Test and the Mortimer-Filkins test. It concluded that the medical advisory board concept would be neither necessary nor efficient; trained paraprofessionals could obtain the same degree of accuracy in less time and at less expense. It also concluded that there was no scientifically acceptable evidence to demonstrate that classifying drinking drivers or establishing customized rehabilitative treatment programs based on such classifications have positive driving-record effects. (The authors noted that these results do not mean that we can conclude such programs are ineffective, since nearly all research evaluations reviewed had methodological deficiencies.) In contrast, there was evidence to suggest that punitive sanctions had an impact on subsequent driving record and deterrent effects on the general driving population. This was particularly true of license suspension.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

Several of the study recommendations were embodied in subsequent law changes (California's original .10% illegal per se law, the inclusion of BAC information on DUI convictions, and the use of license restrictions).

SUPPLEMENTARY INFORMATION:

This description covers the final report. Two related (unnumbered) interim reports were also produced:

Interim Progress Report to the Legislature of the State of California, in Accord with Resolution Chapter 134, 1971 Legislative Session (SCR 3 -Harmer), April 1972.

Interim Progress Report to the Legislature of the State of California, in Accord with Resolution Chapter 152, 1972 Legislative Session (SCR 44 -Harmer), April 1974.

TITLE: Medically Impaired Drivers: An Evaluation of California Policy (Senate Bill 2033 - Garcia)

AUTHOR(S): Mary K. Janke, Raymond C. Peck, & Dell R. Dreyer

DATE: September 1978

REPORT NUMBER: 67

FUNDING SOURCE: Departmental Budget

NTIS NUMBER: PB291489/AS

PROJECT OBJECTIVE:

To evaluate the Department's licensing policies and practices relative to drivers with mental or physical conditions which might affect their ability to drive safely.

SUMMARY:

Under existing law at the time of writing, DMV may not issue or renew the driver's license of a person who is unable to operate a motor vehicle safely on the highway because of lapses of consciousness or other disorders. SB 2033 mandated the Department to evaluate its licensing policies and practices relative to drivers with disabling medical disorders, and to determine whether these policies were justified on traffic safety grounds or whether they were arbitrary and discriminatory. The study was defined by SB 2033 to include reviews of traffic safety and medical literature, collection of data on the accident involvement rate of drivers with disabling mental or physical conditions, evaluation of the justifiability of then-current DMV practices with regard to such persons, and evaluation of the Department's effectiveness in reducing the accident risk levels of drivers with mental or physical disabilities.

In order to hold the study to manageable size it was decided, first, to limit its scope primarily to cases in which a driver safety specialist (then called a Driver Improvement Analyst or DIA) was needed to judge the person's fitness to drive, as distinct from cases dealt with in the ordinary driver's license screening process. As explained in the report, cases evaluated reasonably well by the ordinary testing process include loss or functional impairment of limbs, impairment of mobility in the trunk or neck, and impairment of vision or hearing. If such conditions are permanent or continue over an extended period, they are readily recognizable by a driver's license examiner and may be the basis for either denial of a license or issuance of a restricted license. For nonprogressive disabilities, a driver's license was almost always issued by the license examiner if the subject could pass the standard written and drive test. Conditions which are transient, fluctuating, or progressive were usually referred to a DIA for investigation if they came to the attention of the Department. Such referrals could result in an informal interview in which no action might be taken or, if deemed necessary, an administrative hearing before a DIA. License revocation or medical probation might be taken against the subject's driving privilege following the hearing.

Second, the study was limited to cases of discretionary actions on grounds of physical/mental (P&M) disability. Cases of mandatory action were excluded unless a discretionary P&M action was also taken against the subject. Such dual actions are relatively rare, and usually involve alcohol offenses. Physical and mental (P&M) disabilities which were considered at some length include: Neurological disorders which may cause lapses of consciousness or control, diabetes mellitus, cardiovascular or cerebral vascular disease, excessive alcohol use, excessive drug use (including drugs used as medication), and mental or emotional illness.

The report concludes that, because the accident rate of P&M drivers is substantially inflated over the population rate, differential licensing treatment for P&M drivers as a group is justified on traffic safety grounds. The Department's Legal Office further gave the opinion that, because of this higher accident rate, the Department has an affirmative duty to monitor and control the driving of this group. However, the Department's P&M program was found to be not entirely equitable, since there were other groups of drivers with even higher accident rates than P&M drivers who were not acted upon by the DMV until their driving records as individuals become extremely deviant.

Furthermore, some sub-categories of P&M drivers were acted upon more frequently or more harshly than others with, at best, dubious basis for this differential treatment. Analysis of the types of departmental actions typically applied revealed that cerebro- and cardiovascular patients and alcoholics tended to receive lenient licensing actions (no action or probation) while epileptics and patients with mental disorders tended to receive harsh licensing actions (suspension or revocation). This occurred despite the fact that, as a group, alcoholics are relatively high-risk drivers, while those with epilepsy and mental disorders are relatively low-risk groups. Also, the wording of the lapse-reporting law made epilepsy patients considerably more likely to be brought to the attention of the Department than were other P&M groups, and this could not be justified on the basis of their accident rate.

The report also concludes that medical probations requiring periodic medical reports are extremely expensive to operate and not justified on the basis of their effectiveness. It recommends that this type of probation be reserved for the most serious and recalcitrant of cases.

Overall, P&M programs were found to be expensive, to impact a very small number of drivers, and therefore not to represent an efficient allocation of departmental resources. The report accordingly makes several other recommendations involving streamlining of operating procedures to improve the cost-efficiency of these programs. It specifically recommends that the Department carefully consider the driving record of individual P&M drivers when selecting appropriate licensing actions, in conformity with its usual practice for other groups of deviant drivers.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

Study recommendations that were implemented include a reduction in medical probations requiring periodic medical reports, revision of medical reporting forms to include more comprehensive and relevant medical information, rewriting of departmental notices to be more understandable and less threatening in style, better explanations of the individual's due process rights, more efficient methods of processing P&M cases. The report had also recommended that the state's mandatory lapse of consciousness law not be repealed, but that the law be changed to allow physicians to report directly to the DMV. This recommendation was accepted by the Legislature for review. Much later (1990), and not as a result of this report, the law was amended to require local health officers to report morbidity information directly to DMV. Another recommendation, that DMV, in cooperation with the Board of Medical Quality Assurance (BMQA), prepare an informational brochure for periodic distribution to physicians, was never fully implemented. However, three informational articles produced by DMV staff were published in the BMQA newsletter.

Development of an objective set of criteria for assessing risk in P&M cases was studied in Helander, Report #98, and an unnumbered 1989 report by Hagge and Stylos entitled "Development and Evaluation of a Risk Assessment Strategy for Medically Impaired Drivers—Detailed Analysis." Other unnumbered studies arising from the SB 2033 report and its recommendations were "Accident Records of Self-Reporting Medically Impaired Drivers"; Janke, 1980, and "Alcohol/Drug Abuse Question: Pre-Pilot Study"; Janke, 1980 (see Index of Publications by Principal Author).

The report had recommended that a Medical Advisory Board not be established "at the present time." None was at that time, but such a board was established in 1990. One of the board's assigned tasks was to assist the Department in formulating licensing guidelines for different medical conditions.

SUPPLEMENTARY INFORMATION:

In 1988, the reporting law (Health and Safety Code Section 410) was amended to specifically include Alzheimer's disease and related dementias as reportable conditions. Later legislation (SB 2328, chaptered in 1990) authorized local health officers to report directly to DMV (as mentioned above), authorized physicians to report any medical condition without liability, and required DMV to develop guidelines designed to enhance the monitoring of patients affected with reportable disorders.

An administrative review and survey of departmental policy on drivers with medical conditions (P&M cases) was completed in 1989 (Lockhart, C. *P&M Policy Identification and Review* [draft report], 1989).

A paper, "Reportable Medical Conditions and Driver Risk" by Mary K. Janke, was presented at an International Symposium, *Behavioral Factors that Determine Accident Rates*, held at Santa Monica, California, in May 1993. It was later published in *Alcohol, Drugs and Driving, 9(3-4)*, 1993 . It presents new evidence on conditions reported to the DMV by physicians, and the crash risk of medical impairment groups known to the department.

TITLE: Improved Motorcyclist Licensing and Testing Project

AUTHOR(S): James W. Anderson, Jack Ford, & Raymond C. Peck

DATE: June 1980

REPORT NUMBER: Unnumbered

FUNDING SOURCE: National Highway Traffic Safety Administration

NTIS NUMBER: None

PROJECT OBJECTIVE:

(1) To determine whether two improved motorcycle licensing programs were more effective in reducing accidents and convictions of novice motorcyclists than the standard program, (2) to determine whether applicant characteristics influenced the accident-reducing effectiveness of the licensing program, (3) to determine the predictive validity of the standard and improved knowledge and drive tests, and (4) to determine the effectiveness of remedial skills training.

SUMMARY:

This report presents the final analyses and evaluation of the relative effectiveness of two improved motorcycle licensing programs compared to California's standard licensing program. The findings are based on a sample of 40,874 original applicants who were randomly assigned to the programs over a three-year period (1976-78). The two improved programs were identical, with the exception that one (program B)

required that skill test failures complete a remedial skills training program before retesting. The driver record analyses indicated a statistically significant reduction in motorcycle accident rates during the year after application for each of the two improved licensing programs in comparison with the standard program. The magnitude of the first-year motorcycle accident reductions was 15% for the program incorporating the new tests only and 21% for the program with new tests and a training component ($p<.001$). Comparisons of the licensing programs on the other criterion measures revealed that the two improved programs did not differ from the standard program in their impact on motorcycle and automobile convictions, automobile accidents, and total accidents and convictions. However, the improved program with remedial training did result in a significant (14%, $p<.05$) reduction in total number of accidents involving an injury or fatality.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

The new written tests and motorcycle handbooks were adopted for statewide use in late 1978. A less costly version of the new test (MOST II), which did not require a range location but could be given in a DMV parking lot, was implemented in several field offices and was evaluated in a subsequent study. It did not prove effective. See Kelsey, Liddicoat, and Ratz, Report #106.

SUPPLEMENTARY INFORMATION:

Anderson, J. The effect of new motorcycle licensing programs and skills training on the driver records of original applicants. *Proceedings of the International Motorcycle Safety Conference, Vol I*. Motorcycle Safety Foundation. Washington, D.C., May 18-23, 1980.

Peck, R. C., Anderson, J., & Ford, J. Improved motorcycle licensing and testing project. *Proceedings of the symposium on traffic safety effectiveness (impact) evaluation projects*. National Highway Traffic Safety Administration and National Safety Council. Rosemont, Illinois, May 19-21, 1981.

Received NHTSA's Award of Honor in Recognition of Contribution to Traffic Safety Evaluation Research Literature, 1982.

Peck, R. C., Anderson, J. W., & Ford, J. The traffic safety impact of two experimental motorcycle licensing programs. *Traffic Safety Evaluation Research Review, 3*(1), 21-35, 1984.

TITLE: A Profile of Uninsured Motorists in California

AUTHOR(S): Jensen Kuan &
Raymond C. Peck

DATE: February 1981

REPORT NUMBER: 78

FUNDING SOURCE: Departmental Budget

NTIS NUMBER: None

PROJECT OBJECTIVE:

To determine the profile of an average driver suspended pursuant to California's financial responsibility laws.

SUMMARY:

Two distinct data sets comprised the primary study material: (1) a sample of 125,341 drivers suspended in 1978 for not supplying evidence of insurance following a reportable accident, and (2) a sample of ZIP codes selected to provide a wide range of uninsured-motorist rates. Compared to the average California driver, the financially irresponsible driver was found: (1) to have a much worse prior accident record, (2) to have a much worse prior traffic conviction record, including major convictions, (3) to more often be young, and (4) to more often be male. The ZIP code analysis indicated that ZIP codes with high rates of uninsured accidents had significantly lower median incomes, more poverty-level persons, and lower educational levels than did ZIP codes with a low rate of uninsurance.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

Not applicable; descriptive study only. The results were used in making related policy decisions and for legislative proposals and bill analyses.

SUPPLEMENTARY INFORMATION:

See Marowitz, Report #131.

TITLE: The Accident Record of Drivers with Bioptic Telescopic Lenses.

AUTHOR(S): Mary Janke & Gregory Kazarian

DATE: February 1983

REPORT NUMBER: 86

FUNDING SOURCE: Departmental Budget

NTIS NUMBER: None

PROJECT OBJECTIVE:

To determine whether the accident rate of drivers with bioptic telescopic lenses ("bioptic drivers") was great enough to warrant denying them a license to drive, as a 1982 American Association of Motor Vehicle Administrators resolution recommended.

SUMMARY:

The bioptic driver group consisted of 229 drivers. A randomly selected comparison sample consisted of 21,064 drivers. The two-year total and fatal/ injury accident rates of the bioptic group were normalized to equate the bioptic group statistically to the comparison group with respect to sex and age. Normalized accident rates for bioptic drivers were significantly greater than the corresponding rates for comparison drivers, being 1.5 and 2.2 times as high for total and fatal/injury accidents, respectively.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

Since other licensed groups of high-risk drivers have even higher accident rates, it was recommended that bioptic drivers continue to be licensed. However, it was also recommended that greater imposition of license restrictions and more stringent post-licensing control be applied to these drivers. A study of visually impaired drivers who do not use bioptic telescopic lenses was recommended as well, since it is possible that some bioptic drivers would actually drive more safely without their telescopic lenses. Departmental management concurred with the recommendations for

operational improvements, but all of the recommendations had not been fully implemented as of this writing. The recommended additional study was not conducted.

SUPPLEMENTARY INFORMATION:

A longer technical report of this study was published (Janke, M. [1983], Accident rates of drivers with bioptic telescopic lenses, *Journal of Safety Research*, *14*, 159-165). In addition to the analyses described above, the technical report includes an analysis of the driving records of bioptic drivers prior to and subsequent to acquisition of telescopic lenses, and an analysis of total and fatal/injury accidents for bioptic and comparison drivers with valid licenses only. The former analysis showed no significant difference, but a suggestive trend toward increased accidents in the year following lens acquisition. The latter analysis showed significantly more total accidents for bioptic drivers with valid licenses (unnormalized rates); the difference was not significant for normalized total accident rates. There was no significant difference in fatal/injury accident rates between the validly licensed bioptic group and the validly licensed comparison group, regardless of whether or not rates were normalized.

A list of specific program deficiencies and recommendations were summarized in a non technical memorandum to the cognizant program division.

A replication of the study was published in 1996 (see Clark, Report #163). The results closely paralleled those of the present study.

TITLE: Appendix H of "Administrative Review, Analysis, and Recommendations for California Heavy Vehicle Operator Licensing Program"

AUTHOR(S): Michael Ratz & Shara Lynn Kelsey

DATE: April 1983

FUNDING SOURCE: Office of Traffic Safety and National Highway Traffic Safety Administration

REPORT NUMBER: Unnumbered

NTIS NUMBER: PB83-213447

PROJECT OBJECTIVE:

In conjunction with a project intended to develop enhanced licensing procedures for heavy-vehicle operators, data on all original and 65,000 renewal drivers licensed to drive heavy commercial vehicles (class 1 and 2 drivers) were analyzed.

SUMMARY:

It was found that class 1 and 2 drivers had nearly twice as many accidents as class 3 drivers (operators of personal passenger vehicles). Among class 1 and 2 drivers, it was found that younger drivers had more accidents, and that less experienced drivers, within all age categories, had more accidents. However, the importance of experience was not as great among older drivers.

Class 1 drivers (licensed to operate articulated trucks as well as smaller vehicles) whose drive tests were waived because they presented a certificate of experience issued

by a departmentally approved company, had fewer heavy-vehicle accidents than did those required to take the test; however, the opposite was true for class 2 drivers (buses, non-articulated heavy trucks). Because random assignment to licensing groups was not employed, this was not interpreted as being a measure of the relative efficacy of the two licensing programs.

Tables showing the subsequent accident records of drivers with different numbers of prior accidents, and prior and concurrent convictions, were generated and are presented. For all variables, a prior record showing more traffic accidents proved to be predictive of a higher subsequent accident rate. Prior records of accidents and convictions were found to be more accurate predictors of subsequent total accidents than of subsequent heavy-vehicle accidents.

Additional data are presented on the mean total and heavy-vehicle accident and conviction records of heavy vehicle operators classified by age, original versus renewal licensing status, certificate of experience versus drive-test licensing procedure, and class of license.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

Some of the recommendations were embodied in the United States Commercial Driver License Act and in subsequent collateral California statutes.

SUPPLEMENTARY INFORMATION:

This data analysis was published as Appendix H of Furtado, B. F., Saenz, P.L., and Eskin, C. G., *Administratative Review, Analysis, and Recommendations for California Heavy Vehicle Operator Licensing Program*. Sacramento: California Department of Motor Vehicles, April 1983.

TITLE: Development of Knowledge and Performance Tests for Heavy Vehicle Operators: Volume I, Development and Field Test

AUTHOR(S): A. J. McKnight, NPSRI; S. L. Kelsey, & M. L. Edwards, NPSRI

DATE: December 1984

REPORT NUMBER: Not a California DMV publication (DOT HS-806688)

FUNDING SOURCE: National Highway Traffic Safety Administration

NTIS NUMBER: Unknown

PROJECT OBJECTIVE:

This report describes the development and evaluation of the Truck Operator Qualifications Examination (TORQUE) consisting of the following tests:

(1) Truck Operator Road Test (TORT);
(2) Truck Operator Skill Test (TOST);
(3) Truck Operator Manual (TOM);
(4) Truck Operator Knowledge Examination (TOKE);
(5) Truck Operator Pretest (TOP);

(6) Truck Operator Defects Examination (TODE).

The field-validation phase of the project was done in Los Angeles, California under a subcontract to the California Department of Motor Vehicles.

SUMMARY:

The TOM and TOST evidenced sufficiently high reliability to permit their use as driver licensing tests. The reliability of the TORT was marginal. However, it was no lower than that of a conventional state road test and results on the TORT correlated significantly with results on the TOST, while scores on the conventional state road test did not. The measurement techniques employed in the TORT were recommended to improve the objectivity, reliability, and validity of road tests for heavy-vehicle operators.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

As of the date of writing, the TORT and TOST have not been implemented by the California Department of Motor Vehicles. The department concluded that the study findings did not substantiate the recommendations to adopt the TORT measurement technique.

SUPPLEMENTARY INFORMATION:

The tests are presented in a separate report: "Develop Knowledge and Performance Tests for Heavy Vehicle Operators: Volume II, Licensing Administrator/Examiner Manuals," December 31, 1984 (McPherson, McKnight, & Oates). This document is available to the public through the National Technical Information Service or the National Highway Traffic Safety Administration. The corporate author is the National Public Safety Research Institute (NPSRI).

TITLE: A Typological Analysis of California DUI Offenders and DUI Recidivism Correlates

AUTHOR(S): Gary W. Arstein-Kerslake & Raymond C. Peck

DATE: October 1985

REPORT NUMBER: 100

FUNDING SOURCE: National Highway Traffic Safety Administration

NTIS NUMBER: PB86-1534837

PROJECT OBJECTIVE:

To develop and cross-validate a statistical methodology for predicting DUI recidivism and DUI countermeasure-program compliance of convicted DUI offenders; to determine the extent to which meaningful subgroups of DUI offenders can be formed.

SUMMARY:

DUI offender clustering patterns (i.e., number of clusters/groups) were investigated using *K*-means analysis of data collected from 2,892 first-time and repeat DUI offenders. A nine-cluster solution based upon the psychometric data provided the most intuitively appealing typology. These DUI offender subtypes were established largely on the basis

of personality and attitudinal similarities and were characterized on the basis of their average scores on psychometric and nonpsychometric variables. Descriptive titles were assigned to each of the nine clusters: (1) Negligent Operator, (2) Pre-DUI Alcholic I, (3) DUI Alcholic, (4) Pre-DUI Alcoholic II, (5) Mid-Life Crisis Problem Drinker, (6) Deceptive Problem Drinker, (7) White-Collar Controlled Problem Drinker, (8) Blue-Collar Controlled Problem Drinker, and (9) Social-Normative Problem Drinker. Statistically significant differences in subsequent four-year accident and conviction rates were found among the nine psychometric clusters. The psychometric subtypes identified in this report show many similarities to subtypes identified by other investigators, particularly the "DUI Alchoholic" and "Controlled Problem Drinker" subgroups. The results of the cluster analysis based upon the nonpsychometric data are also presented in the report.

DUI recidivism prediction analyses were conducted for a combined group of 7,316 first-time and repeat offenders. Predictors were selected from the driver record, criminal record, intake interview, and Life Activities Inventory variable domains, both separately and in combination. For most analyses, the recidivism measure was a composite of major convictions (DUI, reckless, hit-and-run) and nighttime (6 p.m. - 6 a.m) and alchohol-related accidents. In almost all cases, the prediction of recidivism was highly significant for both the main sample and the 25% cross-validation sample. The maximum prediction of composite recidivism (R = .246) was slightly less than the maximum prediction of DUI recidivism (R = .271). Additional analyses were performed for first-time and repeat offenders separately partitioned into quartiles based on their predicted composite recidivism score. The differences among quartile means on a number of relevant traffic safety measures were highly significant. It is conjectured in the report that two constraints unavoidably limited the predictability of recidivism: the homogeneity of the DUI offender population and the low statistical reliability of the measurement of recidivism. Of the two, the latter was considered likely to have had the most pronounced effect. This issue is extensively discussed in the report, and an alternative approach using canonical correlation analysis of composite recidivism is assessed.

Analyses of the prediction of DUI treatment program compliance were conducted separately for four of the repeat-offender treatment groups. Discriminant function analyses of the compliance/noncompliance dichotomy were performed. In all cases, the prediction of compliance for repeat offenders was highly significant statistically. The proportional reductions in the error of classification over that offered by model group assignment ranged from about 10% to 60%. In general, noncompliance was much more predictable than subsequent DUI recidivism.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

Not applicable.

SUPPLEMENTARY INFORMATION:

An abbreviated version of this report was published in the *Proceedings of the 34th International Congress on Alcoholism and Drug Dependence* (1985). A modified version of this paper entitled Psychometric and biographical correlations of drunk driving recidivism and treatment program compliance, containing some previously umpublished results can be found in Peck, Arstein-Kerslake, & Helander, *Journal of Studies of Alcohol*, *55*, 667-678, 1994.

TITLE: Teen Driver Facts

AUTHOR(S): Ray E. Huston

DATE: January 1986

REPORT NUMBER: 81

FUNDING SOURCE: Departmental Budget

NTIS NUMBER: PB86-195641

PROJECT OBJECTIVE:

To provide a quick reference on the characteristics of teenage drivers.

SUMMARY:

This report presents findings on teenaged drivers from DMV driver record files and the research literature. The following represents information presented in the report.

The age group 16-19 accounted for 14.2% of all drivers killed or injured in crashes in 1983, but only 5.6% of all licensed drivers, an overinvolvement ratio of 2.5. Teenage drivers average approximately twice as many accidents as adult drivers, yet they drive fewer miles than do adults. Thus the teenage accident rate per mile is, for example, 120% higher than that of drivers aged 20 to 24, although the accident rate per driver is only 55% higher than the rate for 20- to 24-year-olds. Teenage drivers also average about twice as many convictions as older drivers do. Speeding is the most common teenage violation; it is the most common for all age groups, but rates for this type of violation are particularly inflated for drivers in their teens and, to a lesser extent, those in their twenties. Research on young driver risk-taking is discussed in the 2nd edition, as are results of a 1983 study of driver training effectiveness conducted in Dekalb County, Georgia. The results of the Dekalb study indicate, the report notes, that if driver training is to have a substantial effect, it may have to be supplemented with post-licensing procedures, as in a provisional licensing program (see Supplementary Information, below).

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

Not applicable.

SUPPLEMENTARY INFORMATION:

Some of the information contained in this report was published in a paper by Peck entitled *The Role of Youth in Traffic Accidents: A Review of Past and Current California Data* (published in *Alcohol, Drugs, and Driving*, *1*(1-2) 45-61, 1985. Also see the following reports:

Hagge, R. A., & Marsh W. C. (1988). *The traffic safety impact of provisional licensing* (Report #116). Sacramento, CA: California Department of Motor Vehicles.

Huston, R. E., & Janke, M. K. (1986). *Senior driver facts* (Report #82). Sacramento, CA: California Department of Motor Vehicles.

Romanowicz, P. A., & Gebers, M. A. (1990). *Teen and Senior Drivers* (Report #126). Sacramento, CA: California Department of Motor Vehicles.

Gebers, M. A., Romanowicz, P. A., & McKenzie, D. M. (1993). *Teen and Senior Drivers* (Report #141). Sacramento, CA: California Department of Motor Vehicles.

TITLE: Senior Driver Facts

AUTHOR(S): Ray E. Huston & Mary K. Janke

DATE: January 1986

REPORT NUMBER: 82

FUNDING SOURCE: Departmental Budget

NTIS NUMBER: PB86-247327/AS

PROJECT OBJECTIVE:

To provide a quick reference on the characteristics of senior drivers.

SUMMARY:

This report presents findings on senior drivers from DMV driver record files and the research literature. The following are conclusions offered in the report which have considerable generality, in that to date they have been consistently found in DMV studies and others.

When accidents are adjusted for miles driven, both older and younger drivers have higher accident rates than do mid-age drivers. Specifically, the accident rate per mile begins to increase at about age 60; this increase becomes pronounced for drivers aged 75 or older. When convictions are adjusted for miles driven, there is a similar tendency for the youngest and oldest age groups to have the highest conviction rates although the upward trend for older persons is not as steep as for accidents, and drivers at the most advanced ages never approach the conviction rate per mile of young drivers. When accident and conviction rates are not adjusted for mileage, they drop almost monotonically with advancing age, with the exception of a slight increase in accidents at age 70 and beyond. For the group at the highest age category used here (75 and above), the accident rate per driver is less than that for drivers age 40-44. In terms of convictions, drivers 70 years and older are relatively more often convicted of sign-and-signal, right-of-way, and turning violations. While abilities necessary for driving tend to decline at advanced ages, older drivers as a group are able to compensate by driving more cautiously and reducing miles driven.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

Not applicable.

SUPPLEMENTARY INFORMATION:

Huston, R. E. (1986). *Teen driver facts* [Report #81]. Stylos, L., & Janke, M. K. (1989); Berube, E., & Hagge, R. A. (1990); Foster, K. (1991). *Annual tabulations of mature driver program driving record comparisons: Annual report to the legislature of the State of California* (Reports #119, #125, #130), respectively. Romanowicz, P. A., & Gebers, M. A. (1990). *Teen and senior drivers* (Report #126). Gebers, M. A., Romanowicz, P. A., & McKenzie, D. M. (1993). *Teen and Senior Drivers* (Report #141). Sacramento, CA: California Department of Motor Vehicles.

TITLE: Development and Evaluation of a Risk Assessment Strategy for Medically Impaired Drivers. (Volume 8 of "An Evaluation of the California Drunk Driving Countermeasure System")

AUTHOR(S): Clifford J. Helander

DATE: February 1986

FUNDING SOURCE: Office of Traffic Safety and National Highway Traffic Safety Administration

REPORT NUMBER: 98

NTIS NUMBER: PB87-114054

PROJECT OBJECTIVE:

To develop and evaluate a risk-assessment strategy for medically impaired drivers.

SUMMARY:

The risk-assessment strategy developed for this project involved consideration of an explicit set of objective and subjective risk factors in medical condition cases, and was implemented through the use of a "probable risk checklist." The probable risk checklist was pilot tested on 3,722 medical cases in one of four driver improvement regions in California from February 22, 1982 through June 25, 1982. Analysis of the pilot study data reached the following conclusions:

- The best predictor of departmental estimates of risk and licensing actions in medical cases was the risk factor "lack of insight," which is a subjective measure of the Driver Safety Referee's (DSR; formerly called Driver Improvement Analyst or DIA) clinical impression of the driver. This implied that departmental evaluations and actions with respect to medically impaired drivers were more a function of subjective, clinical assessments than they were of objective criteria known to be associated with risk (for example, prior accidents and convictions).

- There generally appeared to be an appropriate and rational relationship between prior driver record, estimated risk, and licensing actions, except for drivers with alcohol-related medical conditions. Although drivers receiving alcohol probation had extremely high prior mean accidents and convictions, their estimated risk was judged to be only slightly higher than average, while their one-year subsequent driver records were the worst of any licensing action group. These data appeared to show that DSRs were underestimating the risk of medically impaired drivers with alcohol-related conditions.

- The reactions of DSRs to the probable risk checklist were generally negative, although they did not appear to be opposed, in principle, to the concept of a systematic strategy for assessing the risk of medically impaired drivers.

Planned analyses on the impact of the probable risk checklist on DSR licensing actions and the predictive validity of objective versus clinical indices were not completed because of funding limitations. Due to the criticality of these analyses for making departmental policy and procedural recommendations, it was recommended that the analyses be completed through future grant funds, or as part of the

Department's ongoing research and development program. The recommended additional analyses, if successful, would enable implementation of a more reliable and valid method of assessing traffic safety risk in medical-condition cases.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:
Notification was sent to all driver safety referees to consider alcohol as a more serious risk factor.

SUPPLEMENTARY INFORMATION:
Paper presented at the *Conference on Driver Competency Assessment*, San Diego, CA, October 24-26, 1990.

For a follow-up to this report, see Hagge and Stylos, *Development and Evaluation of a Risk Assessment Strategy for Medically Impaired Drivers--Detailed Analysis* (unnumbered report), 1989.

TITLE: Mature Driver Core Curriculum Project Literature Review

AUTHOR(S): Mary K. Janke

DATE: November 1986

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: Unnumbered

NTIS NUMBER: None

PROJECT OBJECTIVE:
To review the technical literature on the driving performance of elderly people, as an aid to setting up the curriculum for California's Mature Driver Improvement Program.

SUMMARY:
In addition to presenting accident and traffic conviction rates for the elderly (as a group), this review discusses their sensory changes due to aging, changes in central processing and motor reponse, medical conditions and medications, driving faults, and accident characteristics. The paper also presents an examination of evidence on retraining older drivers. Making recommendations was not an objective of the review and none were made, but the paper stresses the conclusion that no studies appear to support the widely held belief that post-licensure driver training courses reduce accidents. Lack of power and self-selection biases in many studies were found to be complicating factors.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:
Mature Driver Improvement courses for those aged 55 and older were implemented in 1987. At the time of writing, the DMV is required to provide tabulations on a yearly basis to the Legislature, comparing the accident and conviction records of course graduates with those of their age peers who did not take the course. The first report was published in 1989.

SUPPLEMENTARY INFORMATION:

See *Annual Tabulations of Mature Driver Program Driving Record Comparisons* (1989-1993), Reports #119, #125, #130, #136, and #140.

TITLE: Accident and Conviction Rates of Visually Impaired Heavy Vehicle Operators

AUTHOR(S): Patrice N. Rogers, Michael Ratz, and Mary K. Janke

DATE: January 1987

REPORT NUMBER: 111

FUNDING SOURCE: National Highway Traffic Safety Administration

NTIS NUMBER: PB87-206660

PROJECT OBJECTIVE:

To compare the traffic records of visually impaired commercial drivers to those of visually nonimpaired commercial drivers.

SUMMARY:

This study was designed to determine whether waiving the federal static acuity standard adversely impacted traffic safety. Drivers for whom the standard was waived could drive commercially only within California. Two-year accident and conviction rates of visually impaired commercial heavy-vehicle operators (class 1 or 2 licensees) were compared to those of a sample of visually nonimpaired commercial heavy-vehicle operators. Nonimpaired drivers met current federal acuity standards (corrected acuity of 20/40 or better in both eyes), while impaired drivers had substandard static acuity and were classified as either moderately (corrected acuity between 20/40 and 20/200 in the worse eye) or severely (corrected acuity worse than 20/200 in the worse eye) impaired. California and total mileage estimates for Class 1 and Class 2 drivers obtained in a mailed questionnaire did not differ significantly between impairment groups. However, other potentially biasing factors remained and are discussed. Analysis of covariance, with age as a covariate, revealed that on subsequent two-year driver records the visually impaired drivers had significantly, and substantially, more total accidents and convictions than did the nonimpaired drivers. Severely impaired drivers had directionally worse driver records than did the moderately impaired drivers on three of the four traffic safety measures assessed, but these differences were not statistically significant. Study findings led to qualified support for the stricter federal standard, particularly in the case of the severely impaired heavy-vehicle operator.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

The federal "Commercial Motor Vehicle Safety Act of 1986" was implemented in California in 1989. This act was intended, in part, to insure the fitness of commercial drivers and to establish minimum testing standards. But because the act was interpreted as allowing states to set separate medical standards, DMV policy with regard to issuance of waivers for visually impaired commercial drivers remained unaltered following the act's implementation. The restriction to intrastate commercial driving is now (as of late 1991) printed directly on the driver's license.

SUPPLEMENTARY INFORMATION:

This report was cited by the FHWA in a report entitled Visual Disorders and Commercial Drivers in which consideration was given to modifying the federal vision standard. Also see Rogers and Janke (1992). Performance of visually impaired heavy-vehicle operators. *Journal of Safety Research, 23*(3) 159-170.

TITLE: Conference on The Control and Management of High Risk Drivers

AUTHOR(S): California Department of Motor Vehicles

DATE: 1988

REPORT NUMBER: Unnumbered

FUNDING SOURCE: Departmental Budget

NTIS NUMBER: None

PROJECT OBJECTIVE:

To clarify and expand the body of knowledge on the management of high risk drivers by bringing together a body of leading experts in a conference session format.

SUMMARY:

The conference addressed a number of themes relating to driver risk, and papers were presented on a wide variety of target groups.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

Not applicable.

SUPPLEMENTARY INFORMATION:

The conference was sponsored by the California DMV, Sacramento, June 16-17, 1988. The Department published a 11-page summary of the conference entitled *Conference on The Control and Management of High Risk Drivers–Conference Highlights*.

TITLE: Development and Evaluation of a Risk Assessment Strategy for Medically Impaired Drivers—Detailed Analysis

AUTHOR(S): Robert Hagge & Lee Stylos

DATE: December 1989

REPORT NUMBER: Unnumbered

FUNDING SOURCE: Departmental Budget

NTIS NUMBER: None

PROJECT OBJECTIVE:

To further evaluate a risk-assessment strategy for drivers with physical or mental (P&M) conditions.

SUMMARY:

This study evaluated in more detail the Risk Assessment Inventory used in a 1982 pilot study exploring how Driver Safety Referees (DSRs) assess risk and decide on licensing actions with regard to P&M drivers. The findings showed that: 1) DSRs rely primarily on subjective impression in assessing the risk of P&M drivers, and primarily

on medical condition information in determining license action, 2) driver record information is generally better than these in predicting the true risk (subsequent driver record) of P&M drivers, and 3) small but significant improvements in predicting risk could be made by adding masterfile driver record information to the check list. The report outlines a recommended sequence of steps which the authors deemed needed to improve decision-making in P&M cases.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:
The report was made available to the Department's Medical Advisory Board to assist in their work with the Department in developing improved medical assessment procedures.

SUPPLEMENTARY INFORMATION:
See Helander, Report #98, which was the initial study of the P&M Risk Assessment Inventory.

An administrative review and survey of departmental policy on drivers with medical conditions (P&M cases) was completed in 1989 (Lockhart, C. *P&M Policy Identification and Review* [unpublished report], 1989).

TITLE: Drugs and Traffic Safety: Is There a Nexus?

AUTHOR(S): Mary K. Janke

DATE: March 1990

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: Unnumbered

NTIS NUMBER: None

PROJECT OBJECTIVE:
To examine the evidence for a connection, causal or otherwise, between drug use and accidents.

SUMMARY:
Evidence from the epidemiological and experimental literature is reviewed in this paper. This evidence was conflicting, although it is noted that a probable causal nexus can be inferred in the case of some drugs taken under some conditions. The paper points out that, in marked contrast to the BAC as an indicator of alcohol impairment, no widely accepted blood levels then existed at which an individual could be said to be under the influence of drugs other than alcohol. Moreover, no general dose-response relationships between the amounts of various drugs ingested, singly or in combination, and the degree of driving impairment had been discovered. The paper concludes that it would be premature to set and attempt to enforce quantitative blood or urine levels as indicators of drug-related impairment; such impairment could probably better be detected through behavioral testing at the point of arrest. The recommendation is made that any expansion of departmental activity relating to drug use be justifiable on the basis of sound empirical evidence. Such evidence might be developed in the future, the author noted, but the evidence existing at that time did not constitute a sufficiently firm foundation to justify use of extraordinary methods. The paper also recommends that if a decision were to be made to adopt extraordinary methods such as chemical testing of

license applicants, the Department should conduct a large-scale study to determine whether people convicted of drug offenses represent increased safety risks as drivers. While this would not show a causal impact of drugs on accidents, it might at least establish a more definitive associational nexus. The opinion is expressed that, if convicted offenders were found to have an increased accident risk in such a study, it would seem incumbent on the department to subject them to mandatory license suspension, given that a decision had been made to deny licensure to applicants solely on the basis of a positive chemical test. (It should be noted here that under the law at the date of writing, CVC §13202.5, license suspension in the case of drug convictees is only mandatory if the offender was under 21 at the time of the offense; then it occurs only if the court chooses to report the information to DMV.)

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

The recommended study was approved by the DMV Director, and was underway as of late 1991. This study, "The Relationship Between Drug Arrests and Driving Risk" by Leonard Marowitz (Report #142), was published in 1994.

SUPPLEMENTARY INFORMATION:

Administration of the State of California considered introducing legislation to mandate urine-screening of young original license applicants for drug metabolites. Applicants showing a postive test result would be subject to suspension of the driving privilege and delay of license issuance for at least one year. However, this idea was not pursued.

A federal law (PL 101-516) requires states to suspend or revoke the driving privilege of all convicted drug offenders or lose monies that would otherwise be apportioned to them. California law was amended on two occasions (though with sunset dates) to conform with federal requirements. In response to federal objections to the temporary nature of California's compliance, the California Highway Patrol has proposed (in 1996) that the most recent sunset date be removed.

TITLE: Uninsured Motorist (SB 850) Study: Estimate of the Rate and Analysis of the Effects of Economic Covariate Factors and the Intervention of SB 850 on the Rate of Uninsured Motorists in California from 1978 to 1988

AUTHOR(S): Leonard A. Marowitz

DATE: 1st Report March 1990
2nd Report May 1990

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: Unnumbered

NTIS NUMBER: None

PROJECT OBJECTIVE:

To estimate the rate of uninsured motorists in California (first report) and to determine if the rate of uninsured motorists covaried with economic factors from 1978 to 1988 and if the intervention of SB 850 had an effect on the rate (second report).

SUMMARY:

For the first report, the rate of uninsured motorists was estimated in the following three ways:

1. Ratio of total personal passenger vehicles (PPV) uninsured to fee-paid PPV, adjusted for drivers per vehicle.
2. Ratio of (PPV years requiring financial responsibility [FR] coverage - PPV years having FR coverage) to PPV years requiring FR coverage.
3. CHP uninsured motorist violations adjusted for court dismissals.

The rate of uninsured motorists was estimated to vary between 20% and 29% from 1978 to 1988. The estimate for the most recent year evaluated was "about 25%."

For the second report, the rate of uninsured motorists, calculated from 1978 to 1988 using estimation method 2, was the dependent variable. The economic factors used as covariates were:

1. California median household income in constant dollars.
2. California percentage of families below the poverty level.
3. California percentage of families below 150% of the poverty level.
4. California consumer price index.
5. California unemployment rate.

Stepwise and hierarchical regression procedures were used.

Only California median household income, in constant dollars, varied significantly ($F = 5.68$, $p = 0.041$) with the rate of uninsured motorists. Median household income varied inversely with the rate of uninsured motorists, with an adjusted $r^2 = 0.319$. The overall hierarchical regression equation had an adjusted $R^2 = 0.62$, indicating that the five economic and one intervention predictor variables accounted for 62% of the variance in the rate of uninsured motorists.

The intervention effect of SB 850, evaluated for one year post-reimplementation (1988), was not significant. This finding was considered very preliminary, due to the short post-implementation period for which data were available. It was planned that the intervention effect of SB 850 would be reevaluated when data for 1989 and 1990 became available.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

The findings of this study were adopted by the Department. No implementation was required.

SUPPLEMENTARY INFORMATION:

A report to the Legislature on the rate of uninsured motorists, using data through 1990, was in preparation at the time of writing.

TITLE: Uninsured Motorists: Their Rate and Cost to Insured Motorists

AUTHOR(S): Len Marowitz

DATE: November 1991

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: 131

NTIS NUMBER: PB92-161827

PROJECT OBJECTIVE:

To calculate the rate of uninsured motorists statewide and in selected regions of the state where possible, to estimate the costs incurred by insured motorists as a result of accidents caused by uninsured motorists, and to determine the average insurance policy premium cost for an insured motorist.

SUMMARY:

The rate of uninsured motorists in California decreased slightly during the years from 1988 through 1990, from 25% or slightly less to a percentage in the lower twenties. The extent of the decrease varied with the method used to estimate the rate. In all of the regions where the rates could be estimated, a similar pattern of decreased was found. There was some evidence suggesting that enactment of SB 850 required drivers to carry proof of insurance and authorized law enforcement to check insurance status upon any traffic infraction stop.

Uninsured motorists were most prevalent in the Los Angeles Metropolitan Area, especially in the city of Los Angeles, and in the Central Valley. Rates below the statewide average were found in the San Francisco Bay Area, the Northern 14 Counties, and the Southern 2 Border Counties.

Uninsured motorists placed a substantial financial burden on insured motorists. The cost to insured motorists of accidents caused by uninsured motorists was almost $2.1 billion in 1988 and approached $2.4 billion in 1989. This is an average annual cost per insured motorist of $145 in 1988 and $159 in 1989.

Liability insurance, for bodily injury and property damage, is the only type of automobile coverage that is required of all California motorists. The weighted average cost of this coverage, including voluntary and assigned-risk policies, was $370 in 1988 and $395 in 1989.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

Not applicable - the report did not offer recommendations.

SUPPLEMENTARY INFORMATION:

This report was mandated by Senate Bill 2137; Chapter 1595, 1990 Legislative Session (Robbins). SB 850 was allowed to sunset on December 31, 1990.

TITLE: Reportable Medical Conditions and Driver Risk

AUTHOR(S): Mary K. Janke

DATE: 1993

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: Unnumbered

NTIS NUMBER: None

PROJECT OBJECTIVE:

To describe California's medical reporting law, discuss the literature on medical conditions and crash risk, and present crash rates of California's medically impaired drivers and some aspects of how California DMV deals with medically enhanced driver risk.

SUMMARY:

Presents the above, with detailed discussions of epilepsy, insulin-treated diabetes mellitus, and sleep disorders. These can all be subsumed under "lapse of consciousness," addressed by California's lapse reporting law. Also describes DMV's guidelines for action in the case of seizure disorders. Discusses the literature on dementia; as noted, dementia is now explicitly addressed in the lapse reporting law through a 1988 amendment. Briefly describes DMV's dementia guidelines, adopted in 1993.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

Not applicable.

SUPPLEMENTARY INFORMATION:

Presented orally at *Behavioral Factors that Determine Accident Rates*, an International Symposium sponsored by UCLA's Brain Information Service and held in Santa Monica, May 6-9, 1993. Subsequently published in *Alcohol, Drugs and Driving*, *9(3-4)*, 167-183, 1993.

TITLE: California DMV's Driving Under the Influence R&D Progam: Some Recent Findings and Activities

AUTHOR(S): Raymond C. Peck

DATE: January 1993

FUNDING SOURCE: Partial support from UCLA, Brain Information Service

REPORT NUMBER: Unnumbered

NTIS NUMBER: None

PROJECT OBJECTIVE:

To convey information on findings from recent California DMV studies of DUI offenders.

SUMMARY:
This paper describes an interrelated set of data bases used by the California DMV in addressing a variety of issues and hypotheses concerning impaired drivers. A number of California DUI studies are summarized and the report provides novel data on DUI recidvism survival times (months between a given DUI conviction and the next subsequent DUI reoffense).

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:
Not applicable.

SUPPLEMENTARY INFORMATION:
This paper was presented at the *1993 Annual Meeting of the Transportation Research Board*. A summary of the paper appears in *Trasnportation Research Board Circular* #362.

TITLE: Teen and Senior Drivers

AUTHOR(S): Patricia A. Romanowicz &
Michael A. Gebers

DATE: October 1990
REPORT NUMBER: 126
NTIS NUMBER: PB91-172379

AUTHOR(S): Michael A. Gebers &
Patricia A. Romanowicz
Debbie McKenzie

DATE: September 1993
REPORT NUMBER: 141
NTIS NUMBER: PB94-168291

FUNDING SOURCE: Departmental Budget

PROJECT OBJECTIVE:
To provide highway safety administrators, insurance industry representatives, and researchers in the field of traffic safety with information for developing program and policy decisions.

SUMMARY:
Primarily, these reports examine the relationship between age and driving behavior. They state that although teen drivers have always represented the greatest societal risk because of their high accident rate and large numbers, the overall level of risk posed by the older driver is expected to rise with increases in the percentage of the elderly who drive and their increased proportion of the population. These reports confirm results presented in the earlier teen and senior reports indicating that when accidents are adjusted for miles driven, both older and younger drivers have higher accident rates than do mid-age drivers. They also confirm the finding that when accidents and convictions are not adjusted for mileage, they decrease with age, except for a slight increase at age 70 and above.

These reports point out that teens and seniors differ as to the major primary collision factors contributing to fatal/injury and fatal accidents. Speed and alcohol/drugs are the major causes of fatal/injury and fatal accidents among teens, while violation of right-of-way and improper turns are the major causes of fatal/injury and fatal accidents among older drivers. The report concludes that the primary

underlying causative factors of accidents appear to be risk-taking and alcohol among teens, and deteriorating vision and cognitive/perceptual functions among senior drivers.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:
Not applicable.

SUPPLEMENTARY INFORMATION:
Other related reports are as follows:

Gebers, M. A. (1991). *Traffic violation patterns and age* (Report #126b). Sacramento, CA: California Department of Motor Vehicles.

Huston, R. E. (1986). *Teen driver facts* (Report #81). Sacramento, CA: California Department of Motor Vehicles.

Huston, R. E., & Janke, M. K. (1986). *Senior driver facts* (Report #82). Sacramento, CA: California Department of Motor Vehicles.

TITLE: Psychometric and Biographical Correlates of Drunk Driving Recidivism & Treatment Program Compliance

AUTHOR(S): Raymond C. Peck, Gary Arstein-Kerslake, & Clifford J. Helander

DATE: 1994

REPORT NUMBER: Unnumbered

FUNDING SOURCE: Partially by the National Highway Traffic Safety Administration

NTIS NUMBER: None

PROJECT OBJECTIVE:
To identify variables which differentiate DUI offenders who recidivate from those who do not and to also identify correlates of treatment program compliance.

SUMMARY:
The primary objective of this study was to assess the extent to which drunk-drinking (DUI) recidivism and DUI treatment program compliance could be predicted from psychometric, biographical, drinking history and prior-driving-record variables. These analyses were performed on data from 7,316 DUI offenders initially collected in Sacramento County, California, from September 1977 through January 1981. For most analyses, the recidivism measure was a composite of major convictions (DUI, reckless, hit-and-run), nighttime (6pm - 6am) and alcohol-related accidents during the 4-year interval following treatment assignment. The prediction of recidivism was highly significant for both the construct sample and the 25% cross-validation sample. The predictive accuracy was low, however, as evidenced by multiple *R*s of <.30. The predicted rates of recidivism generated for each individual by the regression equation were cross tabulated by other criteria of interest, including total accidents and total injury and fatal accidents. Offenders at high risk of recidivating had substantially higher rates of accidents. The results indicate that reasonably accurate prediction of recidivism

is only possible for discriminating between offenders at the extremes of the recidivism expectancy distribution. The above approach was also used to isolate factors predictive of program compliance (successfully completing treatment). In all cases, the prediction of compliance was highly statistically significant. In general, compliance was much more predictable than was subsequent DUI recidivism. Those offenders having a high probability of being noncompliant were much more likely to recidivate and have accidents than were those with favorable compliance expectancies.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

The findings provide general support for California's policy of triggering license control actions based on drunk driving convictions and the number of moving violation points on a drivers' record.

SUPPLEMENTARY INFORMATION:

This paper was published in *Journal of Studies of Alcohol*, *55*, 667-678, 1994. Much of the paper is based on information contained in a 1985 NHTSA funded monograph entitled *A Typological Analysis of California DUI Offenders and DUI Recidivism Correlates* (see Arstein-Kerslake et al.–Report #100).

TITLE: Age-Related Disabilities That May Impair Driving and Their Assessment

AUTHOR(S): Mary K. Janke

DATE: July 1994

FUNDING SOURCE: National Highway Traffic Safety Administration

REPORT NUMBER: 156

NTIS NUMBER: PB96-106570

PROJECT OBJECTIVE:

To review the literature on disabilities related to aging, their assessment, and their effects on driving. This review represents Task 2 in a cooperative agreement between NHTSA and DMV to develop an assessment system for identifying, and predicting the driving competence of drivers with dementia or age-related frailty.

SUMMARY:

Extensively reviews age-related physiological changes relevant to driving, age-related medical conditions, nondriving assessment instruments, assessment of functional abilities by means of driving tests, and elderly driver programs and licensing provisions in states and Canadian provinces. Presents and discusses an illustration of a three-tier driver assessment system.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

Further work on this project consisted in piloting tests appearing to have promise for identifying and/or evaluating the driving competence of drivers with aging-related disabilities.

SUPPLEMENTARY INFORMATION:

Report of pilot study results was published in November 1997 (Report No. 172).

TITLE: Diabetes Mellitus and Driving

AUTHOR(S): Mary K. Janke

DATE: July 1994

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: Unnumbered

NTIS NUMBER: None

PROJECT OBJECTIVE:

To review the literature on insulin-treated diabetes and driving for members of a Medical Advisory Board subcommittee formulating guidelines for DMV Driver Safety in cases of diabetes mellitus.

SUMMARY:

Research results are mixed. There is probably some increased risk of a crash caused by hypoglycemia in insulin-treated diabetic drivers, but the risk does not appear great. What is most important seems to be education of patients and physicians. Patients should learn to monitor their glycemic levels closely, particularly before driving, and maintain their blood glucose at about 200 mg/dl to provide a safety cushion. Physicians should be made aware of the driving risks of overly strict glycemic control and the possible need to keep blood glucose levels somewhat higher than optimal during extended periods of driving.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

This information was used extensively in formulating the Diabetes Guidelines, approved in 1996.

SUPPLEMENTARY INFORMATION:

Presented as speech to Medical Advisory Board's Diabetes Subcommittee, July 20, 1994.

TITLE: The Relationship Between Age-Related Functional Disability and Road-Safety

AUTHOR(S): Raymond C. Peck

DATE: 1996

FUNDING SOURCE: Partial support from General Motors

REPORT NUMBER: Unnumbered

NTIS NUMBER: None

PROJECT OBJECTIVE:

To define the relationship between aging and safe driving for use by General Motors and NHTSA in establishing research funding priorities.

SUMMARY:

This is essentially a literature review of California, national and international studies. The paper identifies areas in need of additional research and outlines a proposal for

assessing the level of self awareness and compensation in drivers with age-related functional disabilities.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:
The above paper is one of 18 currently under review by General Motors in establishing a research grant program on older driver research.

SUPPLEMENTARY INFORMATION:
This paper was presented at a workshop sponsored by General Motors in Leesburg, VA, May 5-6, 1996. (*Expert Panel Conference on Safety and Mobility Issues of Older Drivers*.)

TITLE: An Evaluation of the Traffic Safety Risk of Bioptic Telescopic Lens Drivers

AUTHOR(S): Nancy Clarke & Robert Hagge

DATE: March 1996

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: 163

NTIS NUMBER: PB96-209481

PROJECT OBJECTIVE:
To determine whether bioptic telescopic lens (BTL) drivers pose an increased risk to traffic safety compared to non-BTL drivers of similar age and sex.

SUMMARY:
This report compares the 2-year accident and citation rates for 609 drivers who must wear a bioptic telescopic lens (BTL) device when driving with those for a randomly selected comparison group of 28,109 drivers. The criterion measures were statistically adjusted using age and gender as covariates. The results indicate that the adjusted total and fatal/injury accident rates for the BTL group were 1.9 and 1.7 times higher, respectively, than those for the comparison group. However, an opposite result was found for total citations; the adjusted rate for the BTL group was 0.7 of the adjusted rate for the comparison group on this measure. All of the differences were statistically significant. The differences in the adjusted means were even greater when only drivers with valid licenses were considered. These findings suggest that BTL drivers do not sufficiently compensate for their higher-risk status. The study also found that the department's policy of restricting BTL drivers from driving at night was followed for only 35% of the BTL subjects. The department is in the process of correcting this operational deficiency.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:
It is recommended that the department reexamine its policy of allowing drivers with substandard vision that is not correctable to be licensed under a bioptic lens condition. It is also recommended that an operations audit be conducted to determine the mechanism by which the vast majority of BTL drivers have managed to avoid a sunrise-to-sunset license restriction. The latter effort has already been initiated and a task force will be convened to devise corrective measures.

SUPPLEMENTARY INFORMATION:
Related studies are Janke and Kazarian, Report #86 and Hennessy, Report #152. Also see accident rates of drives with bioptic telescopic lenses by Janke, *Journal of Safety Research, 14*, 159-165, 1983. This paper was presented at the *1998 Annual Meeting of the Transportation Research Board*.

TITLE: Older Drivers with Medical Impairments: Identification and Evaluation

AUTHOR(S): Mary K. Janke

DATE: April 1996

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: Unnumbered

NTIS NUMBER: None

PROJECT OBJECTIVE:
To give an overview of DMV's reexamination process for drivers with medical conditions, as well as other aspects of DMV's P&M (physical or mental impairment) program. To describe a federally funded pilot study to develop a battery of tests for identifying and evaluating the impaired older driver.

SUMMARY:
Presents information indicated above.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:
Not applicable.

SUPPLEMENTARY INFORMATION:
A shortened version was presented orally at the conference *OTS Summit '96—New Horizons in Traffic Safety*, in San Francisco on April 24, 1996. This was described in the TRB newsletter *Committee on the Safe Mobility of Older Persons* in July 1996.

TITLE: Predicting DUI Recidivism. Volume 1: Blood Alcohol Concentration and Driver Record Factors

AUTHOR(S): Leonard A. Marowitz

DATE: July 1996

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: 162

NTIS NUMBER: PB97-113849

PROJECT OBJECTIVE:
To develop equations which predict DUI recidivism risk using blood alcohol concentration (BAC) and other driver record factors. To advance a relatively simple method, consistent with the developed equations, for assessing DUI recidivism risk which could be used in judicial and administrative proceedings to assist in determining appropriate sanctions and treatment.

SUMMARY:

This study examined the relationship between BAC at arrest, driving history, and other demographic factors, and the one-year post-arrest probability of recidivism for DUI convictees. BAC-only prediction models, complex prediction models involving many factors found on the driver record, and simple prediction models containing two or three factors were developed. All models found a third degree or cubic relationship between BAC and recidivism, and showed recidivism to be high at a BAC of 0.00%, decreasing down to a BAC of about 0.09%, increasing to a BAC of about 0.29%, and then decreasing again to a BAC of 0.35%+. High rates of recidivism at high BACs suggest alcohol dependency, while at low BACs other impairing substances are likely to be involved. The mean rate of DUI recidivism for offenders who refused to be tested for alcohol was the same as the mean rate for BAC-tested offenders who had prior DUIs at the time of the arrest.

The probability of DUI recidivism predicted by a simple model using BAC, prior two-year total convictions, and offender level could be used by presentence investigators, judges, or in administrative settings to determine appropriate sanctions, treatment, program assignment, or other remedial measures. The findings support the notion that first offenders with high BAC levels and/or several prior 2-year total convictions are at as high a risk of recidivating as repeat offenders, and might therefore benefit from similar sanctions and/or remedial treatment. The findings also support viewing DUI arrestees with very low BACs as probable drug users with relatively high probabilities of recidivating.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

None at this time. Findings and policy implications currently undder review.

SUPPLEMENTARY INFORMATION:

This paper was presented at the *1998 Annual Meeting of the Transportation Research Board*.

TITLE: Predicting DUI Recidivism. Volume 2: The Incremental Utility of Non-Driver Record Factors

AUTHORS: Leonard A. Marowitz

DATE: July 1996

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: 164

NTIS NUMBER: PB97-113856

PROJECT OBJECTIVE:

To develop equations which predict DUI recidivism risk using factors not found on the driver record, along with driver record factors. To determine, for the samples analyzed and the factors available, whether alcohol assessment instruments and evaluation, and demographic and life-style factors significantly predict DUI recidivism.

SUMMARY:

This study determined if factors not available on the driver record are significant predictors of DUI recidivism in the presence of factors found on the driver record. The

first substudy focused on alcohol assessment factors, while the second substudy focused on demographic and life-style factors. Alcohol assessment factors, including the MAST and CAGE tests, and the interviewer's assessment of alcohol dependency, were not found to be significant predictors of 1-year DUI recidivism, while some demographic factors were found to be significant predictors. DUI recidivism was found to decrease with increasing years of education and with being employed full-time, while it increased with the number of prior alcohol or drug treatment experiences and being on active military duty status. Each substudy identified driver record factors which were also significant predictors of 1-year DUI recidivism.

These findings lead to the conclusion that, for the samples studied, driver record and demographic factors are more important than psychometric assessment factors in predicting DUI recidivism. Possible reasons for this include (1) the wider array of phenomena represented by life-history and demographic variables, (2) the presence of underlying psychological and behavioral tendencies which are manifest in parallel ways in many aspects of an individual's life, and (3) the fallibility inherent in most psychometric instruments.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:
None at this time.

SUPPLEMENTARY INFORMATION:
A letter by Leonard Marowitz and David DeYoung was published in the November, 1996 issue of the *Journal of Studies on Alcohol*, *57*(6), 679. A subsequent letter by Leonard Marowitz and David DeYoung was then published in the November, 1997 issue of the *Journal of Studies on Alcohol*, *58*(6), 671. A letter by Ray Peck was published in the September, 1998 issue of the *Journal of Studies on Alcohol*, *59*(5), 61.

TITLE: Estimating the Exposure and Fatal Crash Rates of Suspended/Revoked and Unlicensed Drivers in California

AUTHOR(S): David J. DeYoung, Raymond C. Peck and Clifford J. Helander

DATE: 1997

REPORT NUMBER: Unnumbered

FUNDING SOURCE: Departmental Budget

NTIS NUMBER: None

PROJECT OBJECTIVE:
To derive estimates of the exposure (amount of driving) and crash rates of suspended/revoked and unlicensed drivers, using fatal crash data obtained from the National Highway Traffic Safety Administration's fatal accident reporting system (FARS) database, and utilizing induced exposure methodology.

SUMMARY:
There have been a number of studies conducted during the past three decades which show that most suspended/revoked drivers violate their license action and continue to drive during their period of disqualification. Although license suspension is known to reduce crash risk, traffic safety researchers also suspect that S/R drivers are

still overinvolved in traffic crashes, but this is difficult to demonstrate because of the lack of good data on their prevalence among all road users. This paper applies the quasi-induced exposure method to fatal crash data obtained from the National Highway Traffic Safety Administration's Fatal Accident Reporting System, to generate exposure and crash rate estimates for S/R drivers in California. The results show that suspended/revoked drivers are innocent victims in 8.8% of all two-vehicle fatal crashes in California (where only one of the drivers was cited by law enforcement for being at fault in the crash), and that unlicensed drivers are innocent victims in 3.3% of such crashes. Using these exposure figures, it was found that, compared to validly licensed drivers, suspended/revoked drivers are overinvolved in fatal crashes by a factor of 3.7:1, and unlicensed drivers by 4.9:1. These findings provide support for efforts to better control suspended/revoked and unlicensed drivers. The paper also discusses limitations to using quasi-induced exposure to estimate the numbers of such drivers on California roads, and concludes that it is not suited to this task.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:
This study does not contain specific recommendations, but rather lends support to current efforts which target suspended/revoked and unlicensed drivers.

SUPPLEMENTARY INFORMATION:
This paper was published in the January 1997 issue of *Accident Analysis and Prevention*, *29*(1), 17-24.

TITLE: Teen and Senior Drivers

AUTHOR(S): Rhonda Aizenberg and Debbie M. McKenzie

DATE: January 1997

FUNDING SOURCE: Departmental Budget and Beverly Foundation

REPORT NUMBER: 168

NTIS NUMBER: PB98-128424

PROJECT OBJECTIVE:
The information is intended to assist highway traffic safety administrators in making program and policy decisions and may also be of use to the insurance industry, traffic safety researchers and the general public

SUMMARY:
This report presents detailed information on teen and senior driver involvement and fault in casualty collisions, and on differences and similarities between crash characteristics for teens and seniors. Demographic trends forecast significant changes in the age distribution of the licensed population. As the total population ages, older adults are expected to account for a rising share of licensed drivers. Senior drivers account for an increased share of casualty collisions, largely due to their growing representation among licensed drvers, this trend is projected to continue over the next 25-30 years as the baby boom generation ages. Teens on the other hand represent a declining percentage of drivers and drivers in casualty collisions, by the year 2025 adults aged 75 or older will outnumber teens aged 16-19.

Teens aged 16-19 have an especially high risk of being at fault in casualty collision. Their involvement index for at-fault collisons indicates that, on average, teens have a rate of culpability 249% higher than all drivers. At fault collisions start to drop after age 19 and do not rise again until about age 70. The rise is attributed in part to declines in driving skill and an increased vulnerability of older frail drivers to injury and death.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:
Not applicable.

SUPPLEMENTARY INFORMATION:
Other related reports are as follows:

Gebers, M. A., Romanowicz, P. A., & McKenzie, D. M. (1993). Teen and Senior Drivers (Report #141). Sacramento, CA: California Department of Motor Vehicles.

Gebers, M. A. (1991). *Traffic violation patterns and age* (Report #126b). Sacramento, CA: California Department of Motor Vehicles.

Romanowicz, P. A., & Gebers, M. A. (1990). Teen and Senior Drivers (Report #126). Sacramento, CA: California Department of Motor Vehicles.

Huston, R. E. (1986). *Teen driver facts* (Report #81). Sacramento, CA: California Department of Motor Vehicles.

Huston, R. E., & Janke, M. K. (1986). *Senior driver facts* (Report #82). Sacramento, CA: California Department of Motor Vehicles.

TITLE: P&M Telephone Hearing Study

AUTHOR(S): Leonard A. Marowitz

DATE: July 1997

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: 170

NTIS NUMBER: None

PROJECT OBJECTIVE:
To examine the effect of the policy change allowing telephone hearings in addition to in-person hearings by comparing the process outcomes of driver safety contacts which occurred prior to the policy change, when all contacts were in person (last-half of 1992), with the process outcomes after the policy change (last half of 1994). The rate of accidents in the year after each contact period was compared to determine the effectiveness of P&M actions in decreasing accident risk in the pre- and post-policy change periods. The study also compared, during the post-policy change period, the effect of in-person versus telephone contacts on process outcomes and accident rates.

SUMMARY:
The study found that the policy change affected reexamination outcomes, with probation being used significantly less for mental, physical, and lapses cases, and revocation being used more for mental cases. Hearing outcomes were unaffected. Interviews had fewer actions sustained and more actions terminated for alcohol cases, but more sustains and fewer terminations for lapses cases after the policy change. The

accident rate after P&M reexaminations did not change as a result of the policy change for any of the P&M groups.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:
Driver Safety Management and hearing officers received copies of the report; the department is reviewing telephone hearing procedures.

SUPPLEMENTARY INFORMATION:
A follow-up study using data from a later time period is being completed.

TITLE: The California Motorcyclist Safety Program—A comment on Billheimer & Mayhew and Simpson

AUTHOR(S): Raymond C. Peck

DATE: Summer, 1997

FUNDING SOURCE: NA

REPORT NUMBER: None

NTIS NUMBER: None

PROJECT OBJECTIVE:
To clarify some research design principle relation to California Motorcyclist Safety Program (CMSP).

SUMMARY:
This paper is a critical review of a report by Billheimer (Systan Corporation) on the effectiveness of the CMSP and a subsequent critique of that report by Mayhew and Simpson (1996) of the Ontario Traffic Injury Research Foundation (TIRF). The paper concludes that the majority of the study limitations addressed by Simpson & Mayhew were appropriate and valid comments of the methodological limitations of the Billheimer study, many of which were acknowledged by, or beyond control of, Dr. Billheimer. Nevertheless, the bottom-line conclusions reached by Simpson and Mayhew warrant serious attention: the observed accident reductions reported by Billheimer cannot be attributed with scientific confidence to the CMSP.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:
N/A

SUPPLEMENTARY INFORMATION:
This commentary was published in the Summer 1997 (pp. 11-12) issue of the American Driver Training Safety Educators Association Chronicle.

TITLE: An Evaluation of the Specific Deterrent Effect of Vehicle Impoundment on Suspended, Revoked and Unlicensed Drivers in California

AUTHOR(S): David J. DeYoung

DATE: November 1997

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: 171

NTIS NUMBER: PB98-128432

PROJECT OBJECTIVE:

To evaluate the effectiveness of California's vehicle impoundment law in reducing crashes and traffic convictions among those suspended/revoked (S/R) and unlicensed drivers whose vehicles are impounded.

SUMMARY:

S/R and unlicensed drivers whose vehicles were impounded were sampled and their 1-year subsequent driving behavior was compared to that of a similar group of S/R and unlicensed drivers whose vehicles were not impounded. The results showed that for those with no prior convictions for driving-while-disqualified (DWS) or driving-while-unlicensed (DWU), drivers whose vehicles were impounded had, on average, 24% fewer DWS/DWU convictions, 18% fewer total traffic convictions and 25% fewer crashes than a similar group of first offenders whose vehicles were not impounded. The effect of impoundment was even more pronounced for repeat offenders, or those drivers with prior DWS/DWU convictions. Repeat offenders whose vehicles were impounded had an average of 34% fewer DWS/DWU convictions, 22% fewer total traffic convictions and 38% fewer crashes than repeat offenders whose vehicles were not impounded. These findings provide strong support for impounding vehicles driven by S/R and unlicensed drivers.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

This study provides evidence that California's vehicle impoundment law should receive continued political and financial support.

SUPPLEMENTARY INFORMATION:

This paper was published in *Accident Analysis & Prevention*, *31*(1), 45-53, January, 1999. This paper was also published as a NHTSA document [DOT HS 808 727].

DeYoung presented this paper at: The Office of Traffic Safety's *Traffic Safety Summit* (5/6/97), The Sacramento Statistical Association's *Brown Bag Lunch* series (10/23/97), The California Association of Drinking Driver Treatment Program's *Fall Forum* (11/21/97), The Office of Traffic Safety's *Police Traffic Services Seminar* (12/9/97), The *77th Annual Meeting of the Transportation Research Board* (1/15/98), the Computerized CLETS Users Group *Southern Chapter meeting* (7/14/98), and the Computerized CLETS Users Group *Northern Chapter meeting* (2/9/99). Also see report 180 (DeYoung, 1998).

TITLE: Assessing the Older Driver: Pilot Studies

AUTHOR(S): Mary K. Janke and Sandra Winter Hersch

DATE: November 1997

FUNDING SOURCE: National Highway Traffic Safety Administration

REPORT NUMBER: 172

NTIS NUMBER: PB98-137789

PROJECT OBJECTIVE:

To evaluate a selection of non-driving tests for their usefulness in identifying drivers with aging-related impairments and predicting the adequacy of their driving performance on a road test. As part of this project, funded by the National Highway Traffic Safety Administration, an extensive literature review (Janke, 1994 Report No. 156) had already been published. This review furnished the basis for test selection.

SUMMARY:

Selected tests were piloted in two California sites, a DMV field office and a private aging-research institute. A different battery of tests was administered at each site. At the field office, volunteers were contrasted with drivers referred to DMV for reexamination in terms of their performance on nondriving and driving tests, and subjects' group was predicted. In addition prediction of road test performance was made from subjects' nondriving test performance. At the other site all subjects had volunteered for the study; prediction of their road test performance was made from nondriving tests. Survey data from licensing authorities and from the subjects themselves were also collected and are reported. Based on study findings, certain visual, perceptual, and cognitive tests were recommended for a three-tier assessment system (see Report No. 156). The first tier consisted of brief screening tests, the second of more intensive and time-consuming tests, and the third was a standardized road test. The report discusses implications of study results for further research and policy issues, including graded licensing.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

The recommended battery of tests will be studied more extensively in five DMV field offices. This study is scheduled to begin in 1999.

SUPPLEMENTARY INFORMATION:

Interim results of the 1997 study were published in *Accident Analysis and Prevention*, *30*(3), 347-361, 1998. A summary of the final report findings was also presented at the 72nd Annual Meeting of the Transportation Research Board (Janke, 1999).

TITLE: An Evaluation of the General Deterrent Effect of Vehicle Impoundment on Suspended and Revoked Drivers in California

AUTHOR(S): David J. DeYoung

DATE: December 1998

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: 180

NTIS NUMBER: PB99-129165

PROJECT OBJECTIVE:

To determine whether California's vehicle impoundment and forfeiture laws are effective in reducing crashes among the general population of suspended/revoked (S/R) drivers, regardless of whether their vehicles have actually been impounded.

SUMMARY:

Crash rates for all S/R drivers in the state, as well as a control sample of non-S/R drivers, were examined over a 5-year period consisting of 3 years before the vehicle impound/forfeiture laws became effective, and 2 years after. Interrupted time series (ARIMA) models used to analyze the crash data showed that while there was a statistically significant drop in crashes for S/R drivers once the laws became effective, there was also a significant drop in crashes among control drivers, who should not be affected by the laws because they are not S/R and thus not subject to them. Furthermore, simultaneous estimation models revealed that the drop in crashes for S/R drivers was no longer significant once crashes for control drivers were statistically accounted for. Thus, this study failed to find compelling evidence of a general deterrent effect of vehicle impoundment/forfeiture.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:

The report recommends that the vehicle impoundment/forfeiture laws receive continued support, since an earlier specific deterrence study convincingly showed that the laws were associated with a statistically significant and sizable drop in crashes and traffic convictions among S/R and unlicensed drivers whose vehicles were actually impounded.

The two studies, considered together, seem to be indicating that impounding vehicles is linked to demonstrable traffic safety benefits, but merely the threat of impounding/forfeiting vehicles is not sufficient to deter the general population of S/R drivers from driving and becoming involved in crashes.

SUPPLEMENTARY INFORMATION:

See report 129 (DeYoung, 1990) and report 112 (Peck, 1987) for recommendations in support of California's subsequent enactment of a vehicle impoundment/ forfeiture law. This paper was published in *Journal of Safety Research*, *31*(2), 51-59, Summer 2000.

TITLE: Teen and Senior Drivers

AUTHOR(S): Mary K. Janke, Scott V. Masten, Debbie M. McKenzie, Michael A. Gebers, & Shara Lynn Kelsey

DATE: July 2003

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: 194

NTIS NUMBER: PB2004-100101

PROJECT OBJECTIVE:

To provide information on traffic records of licensed drivers by age. The report focuses on teenagers and the elderly, and.summarizes international research on the driving safety and driving-related abilities of these two age groups, and on accident countermeasures for them. This information is meant to assist highway safety administrators in making program and policy decisions affecting teen and senior drivers, and it is hoped will also be of use to the insurance industry, traffic safety researchers, and the general public.

SUMMARY:
This report updates statistical information on California teen and senior drivers as published in earlier reports prepared by the California Department of Motor Vehicles: *Teen Driver Facts* (Huston, 1986), *Senior Driver Facts* (Huston & Janke, 1986), and *Teen and Senior Drivers* (Romanowicz & Gebers, 1990; Gebers, Romanowicz, & McKenzie, 1993; Aizenberg & McKenzie, 1997 [with the Beverly Foundation]).

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:
Not applicable, information only.

SUPPLEMENTARY INFORMATION:
None, but this report is one in a continuing series and so is updated on a semi-regular basis.

TITLE: Teenage Driver Risks and Interventions

AUTHOR(S): Scott V. Masten

DATE: January 2004

FUNDING SOURCE: Departmental Budget

REPORT NUMBER: 207

NTIS NUMBER:

PROJECT OBJECTIVE:
The objective of this paper was to review the literature on teen crash risk to identify the specific risk factors that contribute to the high crash rates of teenage drivers.

SUMMARY:
California teenage drivers aged 16-19-years-old have extremely high per capita and mileage-adjusted crash and traffic violation rates. This report summarizes the literature regarding the risk factors involved in their high crash rates, as well as the countermeasures that have been used in California and elsewhere to reduce their high crash risk. Although some portion of teenage crash involvements can be accounted for by poorer basic vehicle handling skills, the research suggests that it is young drivers' immaturity and inexperience, and the resultant risk-taking, that contribute most to their increased crash risk. Certain driving conditions, such as nighttime driving and transporting young passengers, are particularly high risk for teen drivers. The higher crash rates for teens associated with the use of alcohol and drugs may mostly be the result of a general pattern of risky behavior. The countermeasures used to reduce the crash risk of teen drivers that are discussed in this report include driver improvement programs, driver education and training, special licensing programs for teens (provisional and graduated licensing), BAC limits, and curfew laws.

IMPLEMENTATION STATUS OF FINDINGS AND RECOMMENDATIONS:
The report did not make any recommendations.

SUPPLEMENTARY INFORMATION:
None.